Exploring the contribution of problems in team-level functionality to the failure of offshore-outsourced software projects

Philip, Tom ; Wende, Erik ; Schwabe, Gerhard

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EXPLORING THE CONTRIBUTION OF PROBLEMS IN TEAM-LEVEL FUNCTIONALITY TO THE FAILURE OF OFFSHORE-OUTSOURCED SOFTWARE PROJECTS

Tom Philip, Department of Informatics, University of Zurich, Zurich, Switzerland, philip@ifi.uzh.ch

Erik Wende, Department of Informatics, University of Zurich, Zurich, Switzerland, wende@ifi.uzh.ch

Gerhard Schwabe, Department of Informatics, University of Zurich, Zurich, Switzerland, schwabe@ifi.uzh.ch

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Keywords: Offshore outsourcing, project failures, project team, software project.

1 INTRODUCTION

Since the 1990s, there has been a strong upward trend in sourcing IT services from low-cost countries. The software development market has become increasingly globalized and IT services offshoring by organizations from high-cost countries grows continuously, despite global economic downturns (e.g., Aspray et al. 2006). Two main types of offshoring have become established as IT strategies in organizations: captive offshoring, which involves the delivery of IT services by the same organization situated in offshore countries such as India or China, and offshore outsourcing, which involves third-party organizations in offshore countries and is more exposed to project execution risks. Despite the risks inherent in IT offshoring (King & Torkzadeh 2008), the offshore outsourcing market exceeded USD 60 billion in 2010 and is expected to experience double-digit growth in the near future (Willcocks et al. 2010).

The complex nature of software development makes it "notoriously difficult to manage" even in co-located conditions (Keil et al. 1998). With team members from various organizations and countries, offshore-outsourced software development (OOSD) projects are much more challenging to manage than co-located ones (Kotlarsky & Oshri 2005). OOSD projects are reported to be more prone to failure than in-house or domestically outsourced software projects (Iacovou & Nakatsu 2008) because of offshore-specific risks such as language differences, time-zone differences, cultural differences, geographic distance, and coordination challenges (e.g., Carmel 1999; Sahay et al. 2003; Kotlarsky et al. 2006). These risks require additional governance to manage projects, especially to manage teams spread across different locations.

McGrath (1984, p. 7) views teams as "social aggregates that involve mutual awareness and potential mutual interaction." In OOSD projects, teams are seen as ad-hoc social units that deliver one-time outputs and, for the most part, have tasks that "are non-repetitive in nature and involve considerable application of knowledge, judgment, and expertise" (Cohen & Bailey 1997, p. 242). We define an *OOSD project team* as a group of team members from two or more organizations in different countries who work together to accomplish a common project objective. These teams at onshore and offshore locations are responsible for mostly interdependent tasks, and the challenge in the offshore context is to integrate different teams into a single project team. OOSD project teams are embedded in inter-organizational and multinational environments, and these environments set the "conditions under which group interactions take place" (McGrath 1984, p. 14).

The loss of teamness in dispersed teams affects the performance of global software projects (Carmel 1999). As most social science research has concerned co-located teams, there exists little hard research on what aspects of OOSD project teams lead to project failures (Carmel 1999). The failure of team members to work together as a single project team has been an unexplored area in IT outsourcing. A typical OOSD project involving multinational organizations includes client onshore, vendor offshore, and vendor onshore sub-teams[1]. As opposed to working together in in-house projects, OOSD project teams are extended work units that span organizations and countries.

Academic and practitioner works have reported failures in offshore software projects (e.g., Vashistha & Vashistha 2005; Rottman & Lacity 2008). Nevertheless, there has been a lack of in-depth studies concerning OOSD projects and failures. The concept of failure has been defined in numerous ways in IS research, depending on the viewpoint of the researcher. We have adopted a project development perspective to study OOSD projects. The contract between the client and vendor forms the primary control mechanism in IT outsourcing engagements; therefore, we consider the non-fulfillment of contracts to be the basis of defining project failures (Kern & Willcocks 2000). We consider *project failure* to be the cancellation of the OOSD project, resulting in premature termination of contractual

[1] We use the terms "sub-teams" and "teams" interchangeably in this paper.

activities between clients and vendors before the information system becomes operational (Philip et al. 2012). This definition includes projects that were cancelled or insourced because of the vendor's inability to implement the information system, as well as projects in which the vendor was replaced, the offshore activities were stopped, or the project was cancelled at some point.

The setup of a project team in OOSD projects can be complex, as multinational vendor organizations at onshore and offshore locations coordinate the project activities based on their organizational settings. Though previous research has covered several causes of lack of success, project failures in the OOSD environment have not been studied in depth to provide satisfactory explanations regarding the failure of the project team. In this exploratory work, we analyze the unique team-level aspects of OOSD projects that lead to failures, and we seek to answer the following research question:

Which unique team-level aspects of offshore-outsourced software development projects lead to failures and how do they do so?

2 THEORETICAL BACKGROUND

The main theoretical issues relevant to our research concern team cohesion, team performance, cultural variations, work practices, and risk perception. In what follows, we briefly explore each.

Knippenberg and Schie (2000) found that team members identify strongly with the team rather than the organization. The organization, with its many departments and teams, is experienced as a threat to the team members' individual characteristics, whereas team members in smaller teams usually have much more in common, thus promoting identification with the team, according to Knippenberg and Schie (2000). Lakhanpal's (1993) survey, covering 31 completed software projects within a large US electronic company, concluded that the performance of a software project team is highly dependent on the team's cohesiveness and capability. Carmel (1999), in his analysis of global software teams, in turn maintained that despite the team-level capabilities, cross-cultural teams will find the development of cohesion more difficult.

According to Karahanna et al. (2005, p. 4), team culture becomes an "important factor in the interactions and effectiveness of groups." Their study defined cultural values and practices at varying interrelated levels—supranational (regional, ethnic, religious, and linguistic), national, professional, organizational, team, and individual. At the team and organizational levels, practices were found to evolve over time and were more relevant than values, whereas values that hardly change over time were found to be dominant on the supranational and national levels of culture. However, Hofstede et al. (1990) found that organizational culture had more context-specific influence pertaining to work practices, and national culture guided the priorities of team members based on underlying values. Further, Beck et al. (2008) argue that a mutual understanding of organizational cultures among vendor and client team members with a level of 'cultural intelligence' is the key to effective results in offshore projects.

Schmidt et al.'s (2001) Delphi survey conducted in the United States, Hong Kong, and Finland suggested that general risk perceptions among project managers varied according to national culture. Further, Iacovou and Nakatsu's (2008) Delphi survey found offshore-outsourced risks that organizations ought to consider in order to avoid failures. Among 25 risks identified, 9 were specific to the offshore project environment; and the researchers noted that, as a result of higher risk exposure, project managers require more than the fundamental project management skills to successfully execute offshore projects.

Differentiation of project contexts by Snowden and Boone (2007) allowed us to understand the OOSD project context better from a project manager's perspective. Their four contexts include simple (known knowns), complicated (known unknowns), complex (unknown unknowns), and chaotic (unknowables). Lack of familiarity with OOSD projects could result in many unknowns for project managers. Geographical distances between onshore and offshore teams mean that there is a high degree of separation, despite the availability of information and communication technologies (Carmel

1999), and distance can further exacerbate the difficulties in communication, control, coordination, and socializing in offshore software projects (Carmel & Abbott 2006). The main challenge in global software development, according to Carmel and Abbott (2006), is the negative impact of distance on communication and further its negative impact on coordination.

Lack of the social ties required to openly discuss project matters was found to affect the bonding and rapport among team members (Kotlarsky & Oshri 2005). Further, teamwork coordination has been found to affect the effectiveness of the team (Kraut & Streeter 1995). Case studies on coordination mechanisms between vendors and clients by Sabherwal (2003, p. 154) found that both sides can "pull project coordination in different directions." The end result, according to Sabherwal, was somewhere in the middle, i.e., more formal coordination mechanisms such as periodic reports were used than the client wanted and more informal mechanisms such as personal visits were employed than the vendor desired. Diversity of local contexts causes difficulties in transferring embedded and local knowledge between sites (Oshri et al. 2008). Furthermore, Kotlarsky, van Fenema and Willcocks (2006) found that coordination in terms of organization, work, technology, and social interactions allows better management of knowledge interdependencies.

The time, interaction, and performance (TIP) theory of groups offers an elegant framework for understanding the development of OOSD project teams (McGrath 1991). The TIP theory posits that team members engage in multiple, concurrent projects, and any team action involves modes and functions that contribute to organizational and group development. The team modes do not follow a fixed sequence of phases as in Tuckman's (1965) popular model of team development, which encompassed forming, storming, norming, and performing. Team members can follow different modes (inception, problem-solving, conflict resolution, and execution) in concurrent and multiple projects. However, the TIP theory does not explain the lack of teamness in onshore and offshore teams as a result of environmental boundaries such as organizational and national settings.

The agency theory, an important theory used in IT outsourcing to understand the relationship between the principal (client) and agent (vendor), views the contract as a metaphor (Jensen & Meckling 1976; Dibbern et al. 2004). This theory assumes that the agent has access to more private information than the principal and the resulting information asymmetries allow the agent to hide information from the principal during the outsourcing engagement (Baiman 1990). Differences in risk attitudes as well as uncertainties define the hidden behaviors and actions of the principal and agent during the contracting period (Ross 1973; Eisenhardt 1989). An outsourced software project forms a perfect case for the above agency problems due to the intangible nature of software and the difficulties in monitoring incomplete contracts (Keil et al. 2000). Further, imperfect monitoring and verification problems posed by offshore-specific conditions could mean that the agent is not compelled to behave according to the principal's interest (Eisenhardt 1989). These difficulties also explain why additional governance is required for OOSD projects on the team level (comprised of client onshore, vendor onshore and vendor offshore teams) than for domestic outsourcing projects. The situation where a team has to work in an offshore-outsourced context exacerbates the problem of imperfect monitoring in projects involving onshore and offshore teams.

3 RESEARCH METHODOLOGY

A review of the literature has revealed the lack of research into OOSD project failures and of team-level empirical research analyzing the characteristics that lead to failures. In order to obtain deeper insights regarding the onshore-offshore project team context, we employed the grounded theory methodology to explore team-level aspects of the OOSD project environment that lead to failures (Corbin & Strauss 2008). This was the most appropriate methodology to study failed OOSD projects, considering the sensitivity of outsourcing failures and the consequent difficulty of getting access to failed project details.

Interviews, as a data collection method, allowed us to "obtain a rich, in-depth experiential account" of failed OOSD projects (Fontana & Frey 2000). We conducted semi-structured interviews with project

managers from clients and vendors based in Switzerland and India. The semi-structured interview type was used since it has an incomplete script and thus allowed us the improvisation of questions to obtain rich details of the unique aspects that caused failure (Myers & Newman 2007). Project managers having at least two years of project management experience in OOSD projects at the major multinational organizations located in Switzerland were contacted as part of a larger study on failures in OOSD projects. They were chosen as the key informants as they were the "most knowledgeable and qualified" stakeholder involved in failed projects (Glick et al. 1990). They were further asked to recommend other project managers with possible experience of failed OOSD projects.

Out of 42 interviews conducted, 19 interviews (9 from clients and 10 from vendors) were used for this research. Twenty-three interviews were not used for the analysis, as the failures experienced by those project managers did not come under our narrow definition of failure. Those failed projects came under the categories of either "challenged" (Standish 1995) or "nearshore" (Carmel & Abbott 2007) projects.

In our interviews, project managers narrated details of a major OOSD failure in their careers (as well as of the most successful OOSD project in their careers, but that is outside the scope of this paper). Table 1 provides a summary of the overall career experience of project managers. On average, client managers had more IT-related, project management, and OOSD project management experience than vendor managers. Both client and vendor managers had a median value of 1 for OOSD failures; however, the higher standard deviation in terms of failures for clients (11.22) compared to vendors (1.37) could indicate the differences in project contexts for managers.

	Clients	**Vendors**
No. of interviewed project managers	9	10
IT-related (average years)	16.56	15.22
OOSD project (average years)	8.33	9.56
Project management (average years)	11.11	8.56
OOSD project management (average years)	7.22	6.11
Median (standard deviation) of OOSD failures	1 (11.22)	1 (1.37)
Median (standard deviation) of OOSD successes	12 (21.02)	5.5 (16.08)

Table 1. Overall career experience of project managers

On average, the interviews lasted approximately one hour. Interviews were tape-recorded and transcribed, producing 255 pages of textual data, which was coded and analyzed using MAXQDA 10 software. Open and axial coding schemes were employed (Corbin & Strauss 2008) to build data categories and understand the relationships between the emerging concepts and categories. For the initial analysis, open coding was employed to delineate concepts from the data. Further, axial coding was used to relate the concepts that emerged (a total of 91 concepts).

Table 2 summarizes the failed project cases from the interviews, including information about the countries, industries and cancellation phases involved. India was the prime offshore destination in all project cases. The industries represented include banking, air transport, power generation, public sector, insurance, and automotive, but due to the sensitive topic, we assured project managers of anonymity, and thus cannot disclose more details of projects and the organizations involved. All project cancellations happened during the last 10 years and they all involved multinational organizations. As for the cancellation phase: typical phases of an OOSD project include requirement analysis, design, coding, and integration and testing; in our sample, only in cases F, M, and S did the cancellations happen early, during the requirement analysis phase; the rest were cancelled in the integration and testing phase.

Interview cases	Countries involved	Industry	Cancellation phase
A	Germany, India, Switzerland	Power generation	Integration and testing
B	India, Switzerland	Banking	Integration and testing
C	India, Switzerland	Insurance	Integration and testing
D	India, Switzerland	Banking	Integration and testing
E	India, Switzerland	Banking	Integration and testing
F	India, Switzerland	Insurance	Requirement analysis
G	India, Switzerland	Banking	Integration and testing
H	India, Singapore, Switzerland	Banking	Integration and testing
I	India, Switzerland	Air transport	Integration and testing
J	Germany, India, Switzerland	Insurance	Integration and testing
K	India, Switzerland	Banking	Integration and testing
L	India, USA	Automotive	Integration and testing
M	India, Switzerland, USA	Insurance	Requirement analysis
N	Germany, India, Switzerland	Public sector	Integration and testing
O	Germany, India	Automotive	Integration and testing
P	India, Switzerland	Public sector	Integration and testing
Q	India, Switzerland	Insurance	Integration and testing
R	India, Switzerland	Air transport	Integration and testing
S	India, Canada, Switzerland	Insurance	Requirement analysis

Table 2. Failed project cases

Our aim was to develop a substantive theory – in the sense of Gregor (2006), which describes substantive theory as a theory developed for specific areas of inquiries such as failures, divorce etc. – to predict team-related unique characteristics that lead to project failures. Once the theoretical saturation was reached as required by the grounded theory approach, the concepts that emerged were combined to develop theoretical propositions. We further referenced related literature to confirm our findings based on our data analysis (Corbin & Strauss 2008).

4 ANALYSIS AND DISCUSSION

Drawing on the empirical data we had gathered, we analyzed the unique team-level aspects of OOSD projects that lead to failures. Our data analysis of failed projects suggests the emergence of two general categories of issues related to onshore-offshore teams: offshore-specific and non-offshore-specific aspects (Philip et al. 2012). *Offshore-specific aspects* are unique to OOSD projects and require special attention in the onshore-offshore project context. They include the categories of project team-building efforts, team collaboration, awareness of a shared work context, distant team judgment, and onshore-offshore team coordination. *Non-offshore-specific aspects* are not unique to OOSD projects, but they require more attention than in domestic software outsourcing projects in order to offset the

disadvantages caused by the onshore-offshore environment. They include the categories of shared project execution structures and team member competencies.

Based on the emergence of the above categories from the data, we reviewed related literature to see how our findings fit into existing research. Below, we discuss the team-level aspects that lead to failures in OOSD projects.

4.1 Team-building efforts

A lack of efforts to build a functioning project team by integrating team members from the client and vendor organizations could lead to failures. With respect to the team-building exercise among dispersed team members, the onshore vendor PM of case P commented as follows: "You cannot ignore the status of team building. And if you start to ignore it, even if we have methods, even if we have processes, we are running a project. We are not doing business as usual. It's not something that has a clear input and a clear output. . . . And there I need to have a very high focus on team building. And as more of my team is distributed, the more I need to take care of our team building."

As OOSD projects mostly experience semi-virtual interactions, the lack of social ties affects the bonding of team members (Kotlarsky & Oshri 2005). Team cohesion is commonly accepted as a factor that affects project performance (Lakhanpal 1993; Carmel 1999). The project manager of case D remarked on the difficulty of developing intense social ties: "There was a lot of interaction but as you can see through the corrective measures, one member once said, 'I need to be able to look the people I am working with in the eye.' When you have a video conference or a telephone conference, they heard what the other party said but they never had a team-building off the context of the professional element, or always just a personal relationship to the others." The fact that it was difficult for team members to feel that they were part of the project team (Knippenberg & Schie 2000) resulted in a lack of shared identity, which MacDuffie (2007, p. 569) defines as "the degree of commonality in perceiving oneself as a member of an established and esteemed in-group with a particular identity, set of values, norms, and routines."

The lack of development of a common sense of identity within project sub-teams affects the project outcome, leading to project failures. In particular, the vendor offshore team often came to be viewed by the onshore teams as the out-group in the project team, since they were far from the project activities. To emphasize the significance of the development of shared identity among dispersed team members, we formulate the following proposition:

Proposition 1: Shared identity within the project team comprising offshore and onshore teams will reduce the likelihood of project failure in OOSD projects.

4.2 Shared project execution structures

A state of affairs where onshore and offshore team members do not possess a shared understanding of project execution results in projects not being completed according to the original project objectives. The geographical and cultural distances between onshore and offshore teams necessitates mutual agreement on project structures. The vendor onshore manager of case K noted this necessity as follows: "You might have a maverick pulling the project through, but if you don't have a structure for offshore projects, you will not succeed. And offshore [project] requires that to be done." Shared structures include scope formulation, requirement specifications, approvals, communication, documentation, tracking, and roles and responsibility assignment, which require more formality in the absence of direct-meeting possibilities. Differences could result from divergent expectations among teams having varying organizational and professional practices.

Projects that have ill-defined structures will require more time for problem-solving and conflict resolution measures (McGrath 1991). An unambiguous definition of project structures compensates for the social cues that are left out in a semi-virtual work environment, in which only selected team members get the chance to visit their colleagues onsite or offshore. Perceived physical distance

between onshore and offshore teams can be reduced by standardizing work processes, tools, and systems (Hinds & Mortensen 2005). Such work practices within teams could define the organizational and professional cultures of the project team (Karahanna et al. 2005) and lead to a shared understanding of project structures. MacDuffie (2007, p. 569), defined shared understanding as "the degree of cognitive overlap and commonality in beliefs, expectations, and perceptions about goals, tasks, processes, and members' knowledge, skills, and abilities." We formulate the following proposition regarding the shared project structures in OOSD projects:

Proposition 2: A shared understanding of project structures between onshore and offshore teams will reduce the likelihood of project failure in OOSD projects.

4.3 Team collaboration

Client and vendor teams collaborate with each other intensively to develop information systems, and this requires adaptation to the onshore-offshore work context. Team heterogeneity at onshore and offshore sites requires a shared understanding of the team's collaboration mechanisms (Gibson & Zellmer-Bruhn 2001). Kotlarsky and Oshri (2005, p. 40) define *collaboration* as a multi-dimensional process that involves "constructs such as coordination, communication, meaning, relationships, trust and structure." The breakdown of collaboration and communication in project case O was noted by the offshore project manager as follows: "That complete lack of collaboration and communication, and collaboration at the team member level, and communication at the management level [were the aspects that caused failure]. There was no communication. . . . The reason why that happened is that, because of lack of communication, the offshore project manager was not able to direct his team in the right direction. He himself was directionless."

Similarly, a lack of collaboration between the vendor offshore team and the client onshore team reduced the communication intensity in project case N. The vendor onshore team that acted as a facilitator in this social-security-system project ignored the encultured and embedded knowledge of the client team (Sahay et al. 2003) that the offshore team failed to pick up. The communication process was the conversion of "a two-way dialogue into a two-way monologue" (Lee-Kelley et al. 2004) that created issues in attributing meanings and affected a shared understanding of system development. The following proposition captures the importance of direct collaboration in OOSD projects:

Proposition 3: Direct collaboration between vendor offshore and client onshore teams will reduce the likelihood of project failure in OOSD projects.

4.4 Awareness of shared work context

Team initiation efforts lead to interactions among onshore and offshore teams that could develop into a mutual team awareness of the onshore-offshore work context. The lack of awareness of shared work context was noted by the client project manager of case B as follows: "Because it [work context] is different and it is not a question of bad and good, it is different. And if you are not aware enough of this issue then you could not solve it." The client manager expected that the vendor onshore and offshore organizations will manage the local contextual work differences among them; however, a lack of intense collaboration resulted in vendor teams not developing a shared project work context, leading to project cancellation.

Differences in terms of national and organizational cultures hinder the development of shared awareness among onshore and offshore teams (Espinosa et al. 2007). In this case (Case B), the US project manager's rigid and hard-hitting communication style offended and demotivated the Indian team members in project case L, and most of the offshore team members eventually left the vendor company, causing the project to halt. However, with improved awareness among all team members, these differences can be brought under control, as noted by the client manager of case F: "With the

time, with the experience, you get that [culture] factor under control and it doesn't play a role anymore today; because people know how the culture works and how to interact best."

Distributed project collaboration between onshore and offshore teams requires an awareness among the team members of how their presence and contexts relate to the other members (Dourish & Bellotti 1992). However, the absence of social cues and the breakdown of social constraints in the semi-virtual work settings leads to a loss of shared context (Lea & Spears 1991; Carmel & Abbott 2006). Further, dispersed collaboration leads to failure to communicate contextual information, and this results in lack of mutual contextual awareness, which in turn affects the development of mutual knowledge perception (Cramton 2001). The transfer of embedded and local knowledge between sites is known to be affected by the diversity of local contexts (Oshri et al. 2008). Hinds and Mortensen (2005) found that a shared work context between virtual teams could help improve the relationship between interpersonal conflicts and distribution. They defined a shared context as a state in which "team members have access to the same information and share the same tools, work processes, and work cultures" (p. 293); this is a state in which teams can make better sense of team member behaviors. We formulate the following proposition to capture the importance of a shared work context in OOSD projects:

Proposition 4: A strong emphasis on fostering a shared work context between onshore and offshore team members will reduce the likelihood of project failure in OOSD projects.

4.5 Distant team evaluation

Physical distance between the offshore and onshore teams were found to play a key role in judging project development and project teams. The client PM of case D commented that interactions were so rare that the offshore team's work could only be assessed by the deliverables due: "You're going to get a status report and, as long as all the statuses were agreeing, you didn't have any interaction until the next day or whenever the next project review was. So they worked in isolation because they were offshore. We worked in isolation because we were onshore." The isolation of offshore from onshore teams poses difficulties for project managers regarding the evaluation of teamwork. The onshore vendor project manager of case P remarked the challenges of evaluating team collaboration as follows: "There is a barrier in communication. I cannot look into the eyes of the other one, I cannot hear the kind of volume and melody his voice is making or her voice is making. I cannot really ask questions."

Several authors have discussed the separation and isolation among teams caused by geographical distances despite the availability of information and communication technologies (Carmel 1999; Carmel & Abbott 2006). However, our data analysis shows that if the offshore and onshore teams can feel each other's presence more strongly, they are better able to evaluate the members of the other team. This has been defined by Short, Williams and Christie (1976, p. 65) as social presence, which is "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships." It explains how individuals or teams are perceived to be present in the medium by the other individuals or teams. Face-to-face communications are perceived with the highest social presence compared to lean media, such as email, that have fewer social cues and a lower social presence. Nevertheless, depending on the tasks to be executed, the richness or leanness of media required to transmit information and social cues varies, and the media could be chosen accordingly (Hollingshead et al. 1993). For instance, generating ideas is better done through asynchronous media such as e-mail to avoid distractions coming from social cues, whereas negotiations are best carried out face to face. However, the higher social presence brought by richer media such as video-conferencing reduces uncertainties over distance (Eisenhardt 1989) and thus allow better evaluation of team behavior and performance.

Onshore and offshore teams could judge and anticipate the project deliverables in advance when teams feel a stronger social presence as a result of better synchronization of project activities (McGrath 1991). We formulate the following proposition to underline the perception of social presence among teams:

Proposition 5: When onshore and offshore teams experience a higher social presence with regard to one another, that reduces the difficulties in evaluating team behavior and performance and thus reduces the likelihood of project failure in OOSD projects.

4.6 Onshore-offshore team coordination

Contextual knowledge and organizational capacity to deploy team resources in the onshore-offshore environment was found to be one of the capabilities that influenced team development. Failure to coordinate team resources – team members and their knowledge – based on their interdependencies was found to lead to failures. Project case M, for example, had to be cancelled in the requirement analysis phase because the client manager could not manage the offshore team resources. In project case B, the inability of the vendor's offshore coordinator at the onshore premises to manage and integrate the offshore resources into the project team led to the cancellation of the project. Apparently, the coordinator, rather than becoming truly integrated into the broader organization, acted chiefly as an extended arm of the vendor, and thus the coordination between the onshore and offshore parts of the project remained weak.

The vendor offshore and onshore teams are also prone to coordination failures. The onshore vendor PM of project case Q admitted in a figurative way that the onshore team could not offer the required assistance to the offshore team: "In this particular instance, the offshore components of the team were really the tail of the dog. They were not the part that bit or barked." The onshore team failed to coordinate the team resources to transfer knowledge to the offshore team, which led to poor deliverables and eventually project cancellation.

In multinational organizational setups, where vendor offshore teams work as arms of vendor onsite teams, the ability of both vendors and clients to manage their own teamwork (Kraut & Streeter 1995) as well as understand the organizational and national differences of the other side will improve project performance. Faraj and Sproull (2000, p. 1555) referred to *coordination* as "team-situated interactions aimed at managing resources and expertise dependencies", which involves managing dependencies in terms of organization, work, technology, and social interactions (Kotlarsky et al. 2006). Sabherwal (2003) notes that coordination mechanisms preferred by the clients might be different than those preferred by the vendor, which might affect affect the project outcome. Both client and vendor teams need to possess the capabilities (knowledge and capacity) to coordinate team resources and expertise for project execution. We formulate the following proposition to emphasize the necessity of team coordination in OOSD projects:

Proposition 6: Coordination of project team resources among the onshore and offshore teams will reduce the likelihood of project failure in OOSD projects.

4.7 Team member competencies

The competencies of project team members—such as technical, communication, and domain knowledge—influence team performance in OOSD projects. Competencies are of course important in domestic outsourcing as well, but their significance becomes even more pronounced in the Indian-project context with its high employee turnover (Sidhu & Volberda 2011). Several vendors complained about the unavailability of expected resources from Indian providers. The client PM of project case A noted the following about the technical competency of available resources: "The provider didn't tell us, at that point in time, that they did not have many people on this, like really trained on this tool. So the provider assumed that, like it happens in many offshore projects that I've seen, that people could learn on the job and then deliver. But basically, since the requirements were complex and there were so many kinds of communication issues, this did not happen and they got exposed basically." The offshore team members in the above project further lacked the communication competency to interact with the client manager in an unambiguous manner, which led to project slippages and eventually to the decision to abandon the project. The vendor onshore manager of case Q, in turn, found that the domain knowledge of the offshore team regarding the insurance industry was

too inadequate to truly provide a value for the project: "So the fact that they were distant, very distant from the onshore action that was stuck in this cyclical, political game, and that they didn't have a great deal of expertise in doing what they're being asked to do certainly created an environment where this team of people were very, very eager to do what they were being asked to do but could not see the inherent challenges that made it almost impossible to do what they were being asked to do. So they were these offshore guys who kept rolling the rock up the hill and then watching it tumble down again every night. Without stopping and being able to say, 'There's a bloody good reason for this.' "

Technical and domain-specific knowledge have been identified as critical for offshore team performance (Iacovou & Nakatsu 2008; Rottman & Lacity 2008). McGrath's (1991) TIP theory proposes that the project be set up, during the inception phase, with appropriate resources that possess required competencies. However, as the agency theory notes, there is always a risk of adverse selection of team members, which explains the missing team competencies. Adverse selection was referred to by Eisenhardt (1989, p. 61) as "the misrepresentation of ability by the agent." The TIP and agency theories explain the competencies required of the project team during the project initiation.

4.8 Towards an exploratory team failure model

The data analysis of team-level aspects that lead to failures enabled us to develop an exploratory team failure model. We found that the seven aspects discussed above could be grouped in four higher-level categories: team initiation, team interactions, team evaluation, and team moderators. These categories affected the performance of the project team and serious problems in them resulted in project failure. Figure 1 depicts a model of team failure based on the inter-organizational collaboration between client and vendor teams in OOSD projects.

The category of team initiation efforts refers to building up the project team; it includes project team-building efforts and setting up shared project structures. The integration of team members during the team-building process by fostering the development of a shared identity between onshore and offshore sites was found to aid team development. The emerging state of common understanding of project structures between onshore and offshore teams set up a common basis for executing the OOSD project.

Team initiation efforts, in turn, influence team interactions, which are manifested in the collaboration between teams and the awareness of a shared work context among onshore and offshore teams. The team interactions category includes the collaboration between onshore and offshore teams and the project team's awareness of the shared work context. These we found to significantly shape interaction between the various parts of the project team. In particular, we found direct collaboration among all teams to be crucial if failures are to be avoided. Further, awareness of shared work context was identified as an emerging state that allowed team members to identify with the onshore-offshore project context.

Further, team interactions influence team evaluation, i.e., how distant teams judge each other in OOSD projects. Team evaluation in turn influences team initiation by prompting efforts to improve team development. The category of team moderators includes onshore-offshore team coordination as well as team member competencies and they moderate the team performance. Coordination of team resources at onshore and offshore locations improves project performance. Team competencies are a restricting factor that depends on the availability of selected members in the project team. These aspects influence team performance by affecting the other categories; namely, team initiation, team interactions, and team outcome.

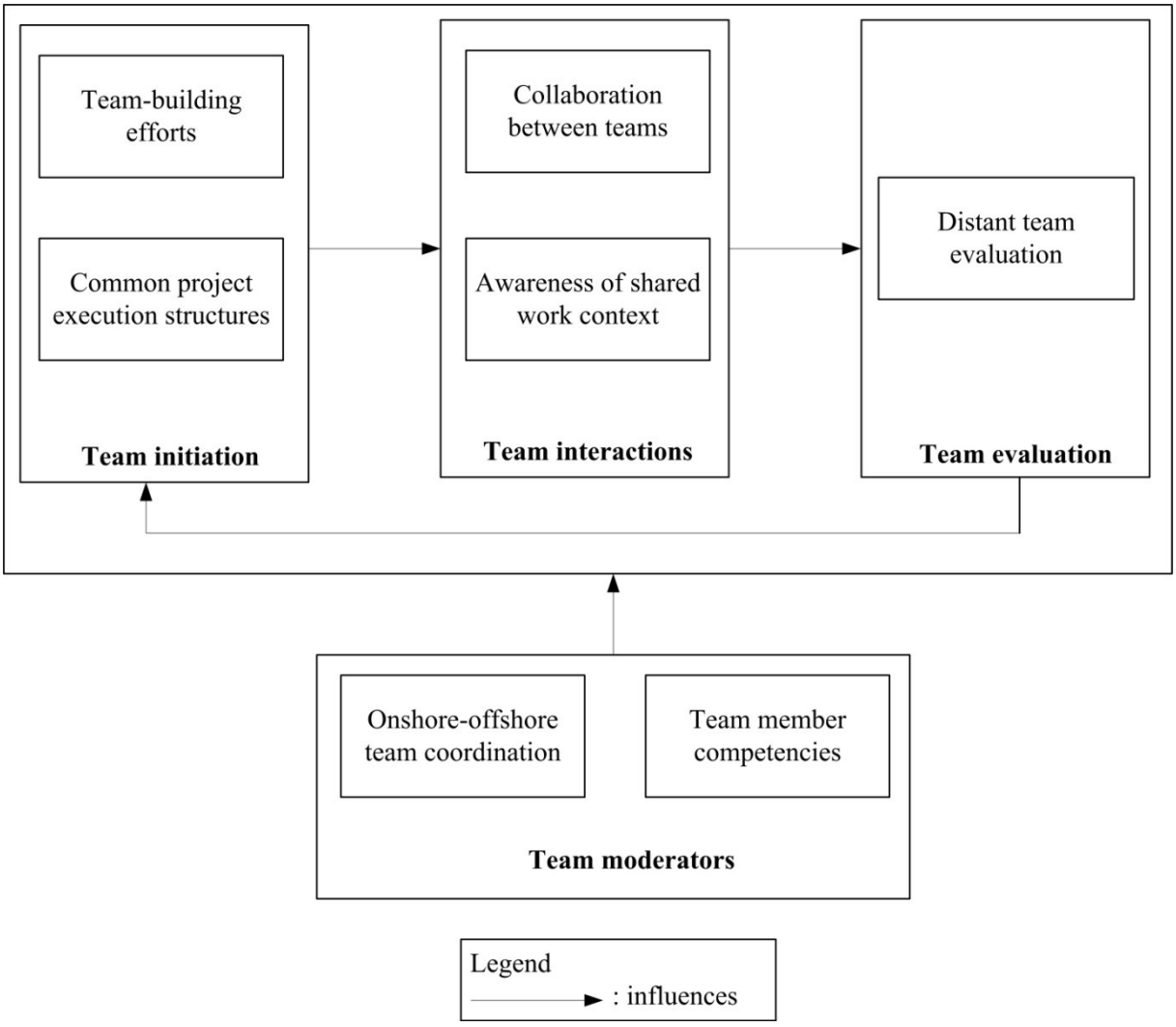

Figure 1. Exploratory model of OOSD team failure.

McGrath's (1991) TIP theory contains some useful guidance regarding team performance of single teams within an organization. However, it does not offer a model of inter-organizational cooperation. An empirical study of 145 software development teams in co-located conditions by Hoegl and Gemuenden (2001) found that teamwork quality – defined by constructs such as communication, coordination, balance of member contributions, mutual support, effort and cohesion – affects team performance. Our exploratory model specifically looked into project cancellations and the way that various aspects affected team performance. It extends the existing literature on teams by adding the dimension stemming from the presence of several sub-teams with various organizational and national backgrounds. We found that in order to avoid failures, the onshore and offshore teams from the vendor and client sides should work as an integrated project team crossing organizational and national boundaries.

5 CONCLUSIONS

In this work, we have investigated the unique team-level aspects that lead to failures in offshore-outsourced software development (OOSD) projects. As there has been scant empirical work on project failures in IS research, this exploratory research analyzed development failures by analyzing both client and vendor perspectives. We identified seven team-level aspects that lead to failures and

discussed them in the light of the extant team literature to develop an exploratory model of OOSD team failure. These team-level failure-causing aspects were identified by project managers as more salient to OOSD projects than to in-house or domestic software development outsourcing projects. To a noteworthy extent, these aspects were able to predict failures in the project team (comprising client onshore, vendor onshore and vendor offshore sub-teams). Further, we identified four higher-level categories that influence team performance, namely, team initiation, team interactions, team evaluation and team moderators.

The main limitation of our research is its India-centricity, as it could point to bias in the data; however, a homogenous cultural sample involving a single vendor country enabled us to develop generalizations. We minimized recollection errors (Glick et al. 1990) in our retrospective interviews by focusing on major events (one failed and one successful project) in project managers' careers. Further research could apply case study research involving both vendors and clients to validate the findings of this exploratory work, provided both vendor and client sides agree to such sensitive research.

Our research has theoretical and practical implications, and makes a contribution to research on project failure and outsourcing. It integrated the perspectives of onshore and offshore teams from the vendor and client sides. This integrative analysis of project failures in OOSD projects forms the major contribution of this work. The TIP and agency theories helped explain team performance, behavior uncertainties and adverse selection of team members. We further juxtaposed the emerged team aspects from the empirical data with the literature to contextualize and evaluate various aspects that point toward project failures. Our exploratory theory of multiple sub-teams, comprising client onshore, vendor onshore and vendor offshore teams, argued for the development of an integrated project team to avoid project failures.

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